

Research Brief

# Advancing AI in defense organizations

The power of collaboration  
and open innovation

*in collaboration with*



# Advancing AI in defense organizations

## Foreword

The use of AI in national defense dates back more than 6 decades, but the transformational impact of this technology on defense operations only began to be realized in the past 10 years. AI-enabled solutions present significant opportunities for defense organizations to improve mission outcomes; however, leaders must be prepared to address the challenges their organizations might encounter on their AI journeys.

To better understand how AI is leveraged by defense organizations and how this technology can shape military operations going forward, the IBM Institute for Business Value (IBV) surveyed 250 defense technology leaders from around the world. Additionally, the IBM Center for The Business of Government collaborated with the IBV to convene a series of roundtables of experts and stakeholders to reflect on the insights from this research, and what it means for the future of AI in defense.

We are pleased to share this second report in a series based on this research. The first report, “[Deploying AI in defense organizations](#),” highlighted insights on the state of AI planning and adoption across defense organizations, as well as the perspectives from the roundtable of global defense experts on where AI can drive value. In this second report, we focus on 3 topics:

- Challenges and obstacles defense organizations encounter in leveraging AI capabilities
- How defense organizations can collaborate with an ecosystem of partners to develop and deliver AI capabilities
- The importance of enabling a culture of innovation and experimentation to advance AI capabilities.

This report, along with the first in this series, provides leaders across the global defense community with insights that can further assist their organizations in realizing the full promise and potential of AI.



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## Realizing the AI opportunity in defense

Technological innovation has long been critical to national defense. Dating back to the early years of World War II when Alan Turing and other pioneering British mathematicians demonstrated the potential of intelligent machines in breaking Germany's Enigma code, researchers have pursued the promise and potential of AI.<sup>1</sup> Since then, AI-enabled solutions have moved out of the laboratory and into production environments. To better understand how AI and AI-enabled solutions are leveraged by defense organizations around the world and how this technology can shape the industry and military operations going forward, the IBM Institute for Business Value (IBV) surveyed 250 technology leaders from defense organizations in 13 countries in 2020 (see "Study approach and methodology" on page 14). Discussions with experts for additional understanding followed in 2021.

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“If you're not ready the moment things happen, then you're irrelevant.”

**General James Amos**, 35th Commandant  
of the US Marine Corps<sup>3</sup>

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As outlined in the [first report](#) in this series, AI adoption is currently widespread across defense organizations globally. Leaders from all defense organizations surveyed say they're at least considering its use. And while all have declared plans to adopt AI, half of the organizations have already implemented AI solutions, and another quarter have pilot projects underway.<sup>2</sup>

AI is clearly a strategically important technology for many defense organizations today, and many more see it as a critical capability in the future. The opportunities are far reaching. In addition to defense-specific applications, defense organizations can also leverage AI-enabled solutions for business and noncombat-focused applications.<sup>4</sup> These solutions present significant opportunities for defense organizations to improve mission effectiveness, but integrating AI capabilities into operational environments introduces unique challenges and risks. So, the question now is: are defense organizations prepared to exploit the possibilities?

To address this question, we asked defense leaders to assess their organizations' preparedness to leverage AI and the barriers to adoption and value realization. In this research brief, we explore 3 key areas:

- The readiness of defense organizations to implement AI and what stands in their way
- How defense organizations are collaborating with ecosystem partners to develop and deliver AI capabilities
- The importance of enabling a culture of innovation and experimentation to advance the development of AI capabilities.

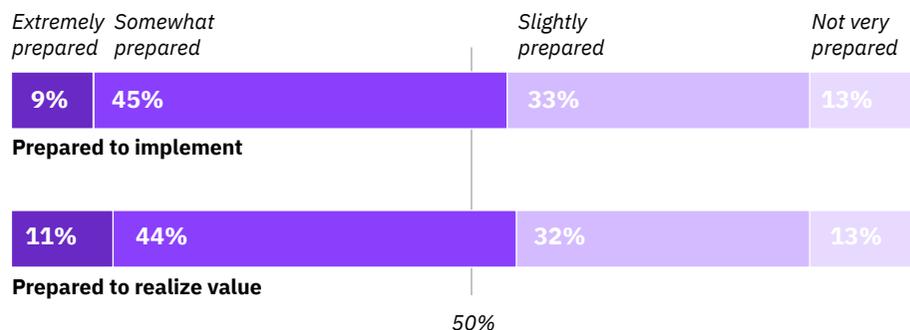
## State of AI readiness among global defense organizations

Throughout history, military units and their leaders have accomplished heroic and remarkable feats despite seemingly insurmountable odds. From the battle for Vienna during the Austria-Ottoman Wars, where a weakly-armed Austrian garrison defended the city from a force 6 times larger and better equipped, to the battle of Yorktown, where American revolutionaries concluded their improbable campaign for independence by defeating one of the most powerful militaries in human history, military leaders have demonstrated courage, competence, and the commitment to overcome virtually any challenge to accomplish the mission.<sup>5</sup> And as military leaders know, readiness requires planning and preparation. Colin Powell, a former US General, Secretary of State, and National Security Advisor, once said, “There are no secrets to success. It is the result of preparation, hard work, and learning from failure.”<sup>6</sup>

So, are defense leaders and their organizations poised to exploit and pursue the potential of AI capabilities today? When we asked leaders about their readiness to implement and gain value from AI, we found their confidence levels middling (see Figure 1). Slightly more than half stated their organization is somewhat or extremely prepared to implement and realize value from AI capabilities today. However, only about 1 in 10 say they are extremely prepared. On the optimistic side, no leaders indicate their organization is not at all prepared.

**Figure 1**

Defense leaders are almost divided in half when evaluating their readiness to implement and realize value from AI, with slightly more saying they are at least somewhat prepared



“Plans are worthless but planning is everything.”

Dwight D. Eisenhower, 34th US President <sup>7</sup>

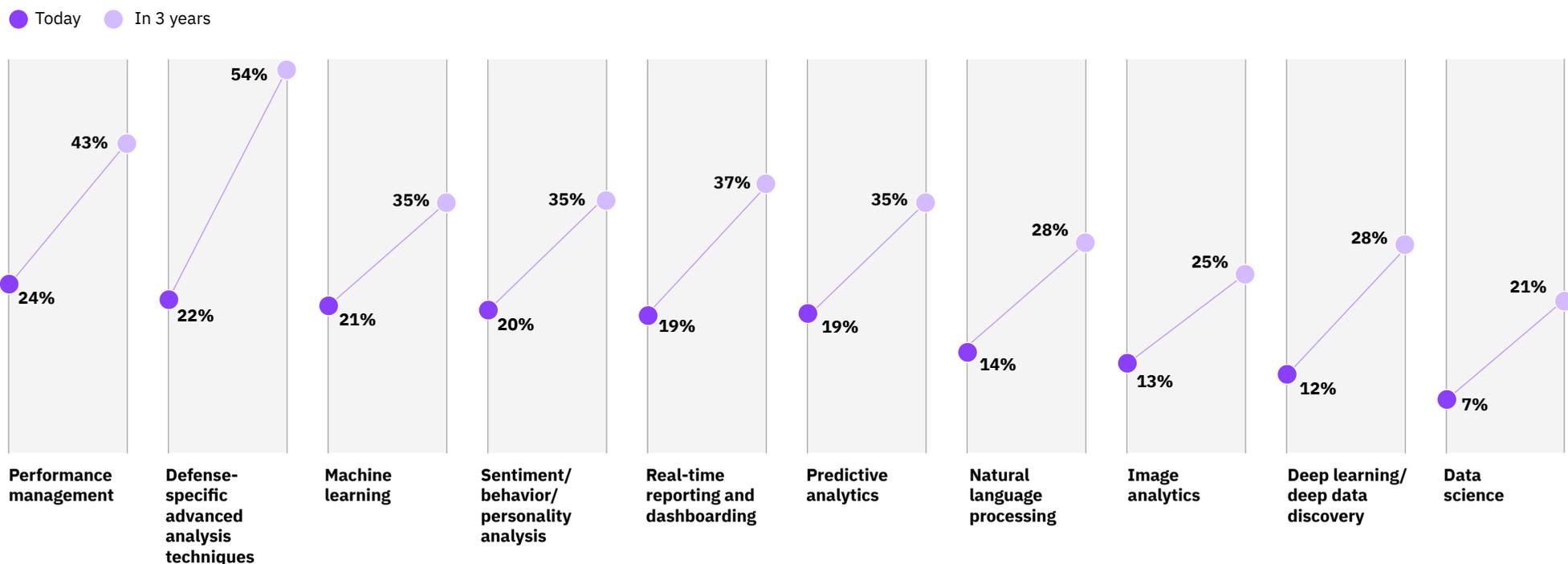
While most leaders are fairly confident in their readiness, many have work to do to prepare their organizations to fully leverage AI. Less than half of defense technology leaders are having real success in adopting AI in their organizations. And very few are confident in the maturity of their analytics and AI capabilities today (see Figure 2). Leaders indicate the greatest maturity in performance management and defense-specific advanced analysis techniques. Meanwhile, 50% tell us their natural language processing (NLP) and data science capabilities are very or somewhat immature. Nearly half say the same about their machine learning and deep learning capabilities.

As we saw in our first report in this series, when it comes to execution, the levels of AI preparedness and the AI journeys of many organizations vary based on the experience of their technical leaders in working with AI. More than two-thirds of surveyed leaders with more than 5 years of experience working with AI say their organization is prepared to effectively implement AI capabilities compared to less than a third of organizations with technical leaders who have less than 5 years of experience. This disparity also exists in terms of organizational preparedness to realize value from AI capabilities.

Many defense leaders are confident they can significantly advance the maturity of their AI expertise in the next 3 years to close capability gaps (see Figure 2). About half of the organizations reporting relative immaturity in advanced capabilities such as NLP, deep learning, image analytics, and data science anticipate improving these capabilities in the next 3 years. And nearly all leaders say they expect to significantly reduce the capability gap for defense-specific analysis techniques.

**Figure 2**

Few defense leaders report very advanced analytics or AI capabilities today but expect the maturity level to almost double or more in most areas in the next 3 years



Note: Percentages represent respondents reporting their analytics and AI capabilities are “very mature.”

## Bumps in the road on the AI journey of defense organizations

When asked to identify the roadblocks on their AI journeys, nearly half of defense technology leaders cite regulatory/policy constraints (see Figure 3). Data-related issues—from governance and sharing to privacy concerns—and the supply of talent are also high on the list, along with the availability of technology. Typically, when we ask government leaders about barriers, funding and resources often top the list. Here, however, only 1 in 5 cite budget constraints as an impediment to implementing AI in their individual organizations. Our roundtable participants tell us that this may be because many resources for building AI capabilities fall outside the budget purview of individual organizations and, therefore, are not seen as a significant obstacle at the organizational level.

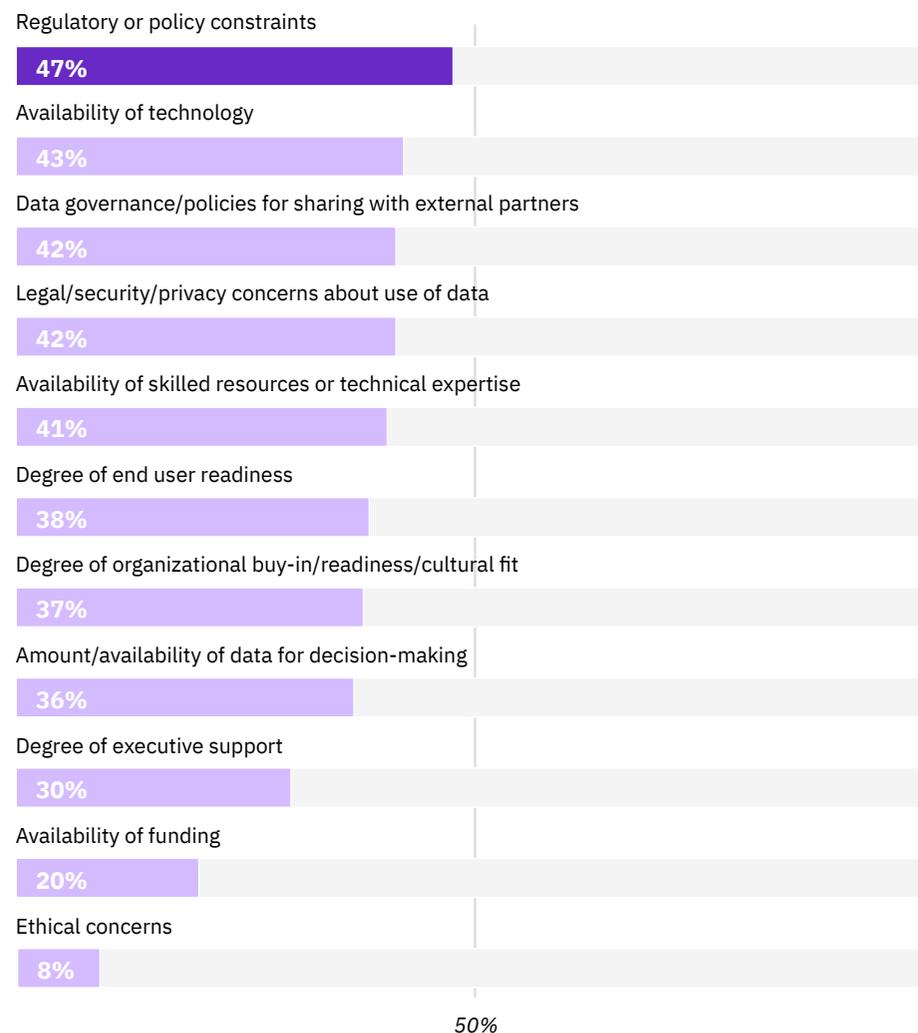
Ethical concerns are often a leading topic in discussions regarding the applications of AI in defense. However, fewer than 1 in 10 of defense leaders point to ethical concerns as impeding implementation. And fewer than 1 in 5 expect ethical concerns to disrupt AI adoption in their organization or the industry more broadly. While ethical concerns are not identified as a key barrier by the survey respondents, roundtable participants did note that ethical concerns are viewed as blockers to AI-related innovation by several organizations with which they have worked. Initiatives such as the North Atlantic Treaty Organization’s (NATO) Principles of Responsible Use should be a key component of an organization’s broader AI strategy. Such initiatives can be critical to defining and adopting more detailed best practices and standards for the ethical and responsible use of AI by defense organizations globally.<sup>8</sup>

“Show me someone who has done something worthwhile, and I’ll show you someone who has overcome adversity.”

Lou Holtz, American football coach<sup>9</sup>

**Figure 3**

Regulatory, governance, and legal concerns are often common barriers to AI implementation



Roundtable participants identified additional challenges hindering the progress of AI initiatives and the ability to scale them into production, including data quality and availability, capability gaps—especially access to skills—and change management issues. Participants also raised the need for policy reform, agreeing that realizing the full potential of AI and other emerging technologies requires comprehensive policy reform and transformation. The group also emphasized that true policy reform goes beyond incremental or additive efforts to modify or revise existing policies. Roundtable participants discussed the critical role initiatives such as the US government’s Technology Modernization Fund (TMF) can play in removing the barriers to innovation posed by traditionally bureaucratic policies and practices. By reimagining how IT modernization projects are funded and executed, the TMF provides agencies the flexibility needed to invest in new projects.<sup>10</sup>

But implementation difficulties run much deeper than just policy, process, and technology. 41% of defense leaders indicate that a lack of skilled resources or technical expertise impedes progress, and most anticipate they will continue to look to private sector partnerships to supplement AI capabilities in the near term. Organizational cultures are also core to the conversation. Just over a third of defense leaders cite organizational buy-in and cultural issues as a top barrier to implementing AI, while only 57% say their organization’s culture is well prepared to drive AI innovation and adoption. In addition, only 55% tell us their organization’s leadership possesses the skills and vision to advance AI capabilities.

## Collaboration advances the AI journey for defense organizations

The pandemic exposed the fragility of global labor markets with many private sector employers struggling to recruit and retain workers. According to a recent IBV global employee survey, 30% of employees changed or planned to voluntarily change jobs in 2021—continuing the trend we saw in 2020.<sup>12</sup> And the pandemic has impacted employee expectations about employers and work arrangements. 56% of employees who voluntarily changed employers in 2021 cited the need for more flexibility as a key reason, while nearly a third indicated they want to work for a company that better fits their values.<sup>13</sup>

The story is similar for the public sector, as outlined in the report released by the US National Security Commission on AI (NSCAI), which emphasizes the severe talent deficit faced by governments. The NSCAI report identifies this skills shortage as “the government’s most conspicuous AI deficit and the single greatest inhibitor to buying, building, and fielding AI-enabled technologies for national security purposes.” And, among other recommendations, the NSCAI report calls for the need to build entirely new talent pipelines from scratch.<sup>14</sup>

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“Great things in business are never done by one person; they’re done by a team of people.”

**Steve Jobs**, Co-founder of Apple Computer, Inc.<sup>11</sup>

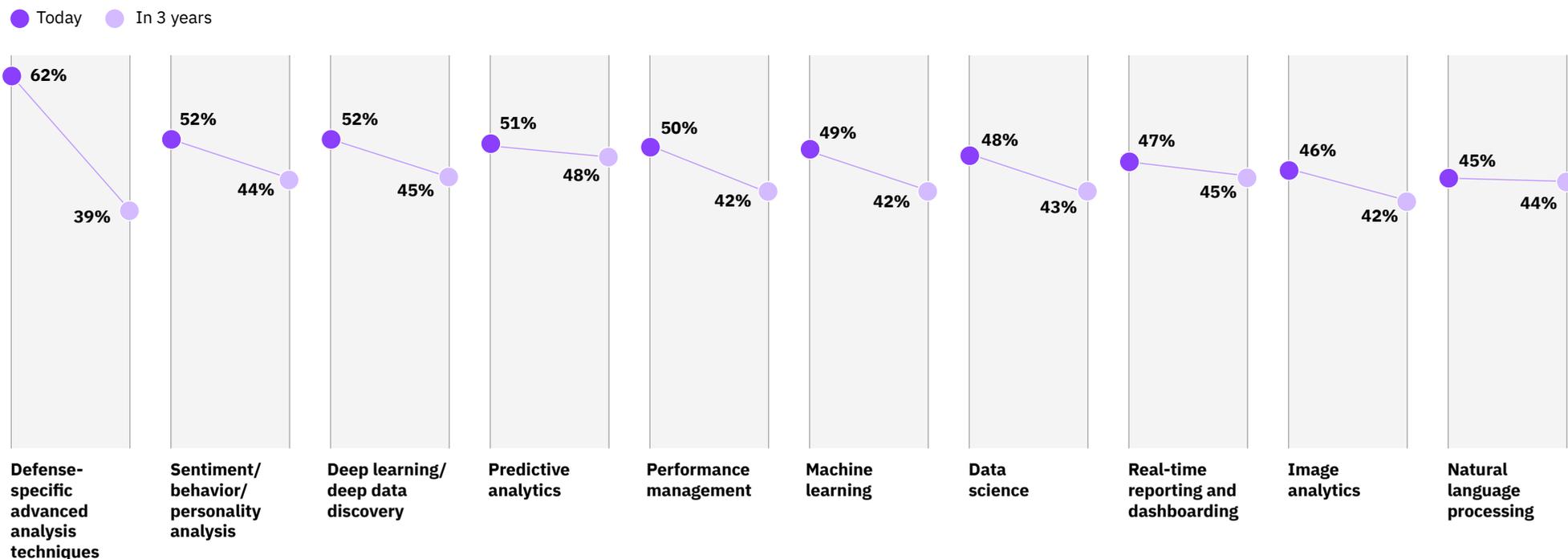
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A challenge of this scope and magnitude requires defense organizations to supplement their expertise shortfall by leveraging partnerships with the private sector. Approximately half of defense leaders say they are doing just that for many of their AI capabilities (see Figure 4). Additionally, defense organizations globally are collaborating among themselves to build capability. This includes NATO’s effort to create the Defence Innovation Accelerator for the North Atlantic (DIANA) to facilitate transatlantic cooperation and exchanges on critical technologies among allies, and partnership agreements between the US and the UK to facilitate Joint All-Domain Command and Control (JADC2) capabilities.<sup>15</sup> (See “Perspectives: Collaborating to build capabilities.”)

Looking ahead, some leaders are confident they can assert their independence by building expertise and capabilities in these areas internally in the next 3 years—in particular, defense-specific advanced analysis techniques (see Figure 4). But nearly half expect to be mostly reliant on the private sector for almost all areas shown in Figure 4. To advance their progress in AI, organizations should continue to pick partners strategically, balancing their choices with how to mitigate any risks these partnerships can pose.

**Figure 4**

About half of defense organizations mostly rely on the private sector for analytics and AI expertise today but expect to increase independence over the next 3 years



## Perspectives: Collaborating to build capabilities

### US and UK research lab collaboration

The UK's Defence Science and Technology Laboratory (DSTL) has partnered with the US Air Force Research Laboratory in a series of joint technical and operation experiments under a 4-year partnership agreement established in December 2020. This partnership has demonstrated for the first time the ability of the US and the UK to jointly develop, select, train, and deploy state-of-the-art machine learning algorithms in support of the nations' armed forces.

The partnership agreement includes objectives to accelerate joint UK/US development and sharing of AI technology and capabilities, spanning from foundational research in test verification and validation to AI algorithm research and development, to joint experiments advancing Joint All-Domain Command and Control (JADC2) capabilities of both nations.

The first event conducted under the partnership agreement demonstrated how the 2 countries can integrate AI technology to create the first end-to-end machine learning research, development, and deployment ecosystem enabling rapid data sharing, algorithm development, evaluation, and deployment. The demonstration successfully showed the integration of 15 state-of-the-art machine learning algorithms, 12 UK and US data sets, 5 automated machine learning workflows for training and retraining models based on mission needs, and the ability to deploy the models as a service to target end users and platforms.<sup>16</sup>

### NATO enables collaboration to innovate in emerging technologies

Emerging and disruptive technologies such as AI can significantly impact the way NATO and ally partners operate, presenting both risks and opportunities. In response, NATO leaders have developed and agreed upon an Emerging and Disruptive Technology Implementation Roadmap designed to help structure NATO's work across key technology areas.

NATO Defense Ministers have also endorsed "Foster and Protect: NATO's Coherent Implementation Strategy on Emerging and Disruptive Technologies." This strategy is aimed at guiding NATO's adoption of emerging and disruptive technologies and creating a forum for allies to collaborate and share best practices. NATO leaders have also agreed to launch a civil-military Defence Innovation Accelerator for the North Atlantic (DIANA) to foster transatlantic cooperation on critical technologies, promote interoperability, and harness civilian innovation by engaging with academia and the private sector, including startups.<sup>17</sup>

## Defense organizations find value in innovation and experimentation

While respected and celebrated leaders often speak of the value and necessity of failure in the innovation process, failure still makes many—perhaps most—people uncomfortable. Only 13% of leaders we surveyed say failure is recognized as inherent in the innovation process in their organization. Moreover, only about 1 in 5 tell us that employees in their organization are not afraid to experiment and fail (see Figure 5). This is certainly troubling and points to a wide-reaching trend of fear of failure, which can significantly impact an organization’s innovation capacity. The late John F. Kennedy once said, “Those who dare to fail miserably can achieve greatly.”<sup>18</sup> But first, leaders need to recognize the value of experimentation and foster organizational cultures that accept failure as integral to innovation.

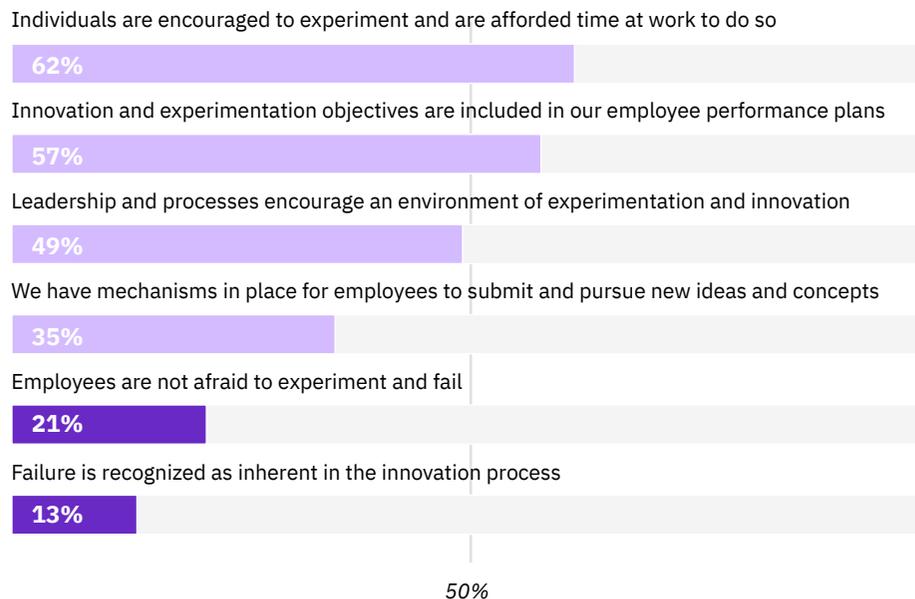
“Too often we just look at these glistening successes. Behind them in many, many cases is failure along the way, and that doesn’t get put into the Wikipedia story or the bio. Yet those failures teach you every bit as much as the successes.”

**Admiral Mike Mullen, US Navy**<sup>19</sup>

**Figure 5**

Defense organizations do not exhibit a culture that accepts failure as integral to innovation

### In your organization ...



Organizations actively embracing experimentation are seeing the benefits. Nearly 3 in 4 leaders say experimentation has positively affected innovation in the organization. Among organizations with technical leaders who have more than 5 years of AI experience, the portion climbs to 85%. However, experimentation is not widespread, with only 30% of leaders saying their innovation activities include active experimentation. And only 1 in 4 experiments results in operationalized capability. Clearly room for improving innovation and experimentation exists in many organizations—and is critical for defense organizations to pursue the full potential of AI and other emerging technologies. (See “Perspective: US Special Operations Command Technical Experimentation events.”)

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Nearly 75% of defense leaders say experimentation has positively affected innovation in their organizations.

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### **Perspective: US Special Operations Command Technical Experimentation events**

Not surprisingly, a model for breaking down traditional barriers to innovation in defense can be found in the special operations community. Special operations units must, out of necessity, be creative and adaptive. If one solution to a problem fails, special operators must adapt and overcome to find alternative ways to accomplish the mission, often in challenging conditions with limited to no support resources or capabilities. In this environment, they can't be afraid to try new things—and it's better to test out a new concept in the sandbox than during an operational deployment.

To this end, the US Special Operations Command (USSOCOM) hosts Technical Experimentation (TE) events to identify potential technology solutions, impacts, limitations, and utilities to meet the rigorous and demanding technical objectives of special operations forces. These TE events provide a unique opportunity for developers of new and innovative capabilities to demonstrate their technology and gain insight/perspective in a real-world collaborative environment.<sup>20</sup> And failure is accepted as part of the process. As one roundtable participant shared, “It's OK to fail in [US]SOCOM. They're piloting new technologies where it is ok to experiment and fail.”

## Key takeaways: How defense organizations can realize AI's possibilities through collaboration and open innovation

The potential value of AI to national defense is immense. However, defense leaders need to address implementation challenges and remove roadblocks to pursue AI's transformative power. Success requires a focus on 2 goals:

1. Building and expanding *teaming and collaboration* opportunities with ecosystem partners
2. Cultivating and enabling cultures and mechanisms that encourage *open innovation and experimentation*.

**Build and expand teaming and collaboration opportunities.** Military professionals know that teamwork is critical to accomplishing any mission and that collaboration with team members is key to solving difficult problems. There is probably no greater example of the importance of teamwork and collaboration than the Allied invasion of Normandy in Operation Overlord during World War II. This operation brought together the land, air, and sea forces of the Allied armies in the largest invasion force in human history.<sup>21</sup> In addition to being a case study for the power of effective teaming, this operation also demonstrates how preparation and trust can greatly extend a collaborative team's capabilities to accomplish what a single entity going it alone cannot.

Organizations should consider the following:

- *Leverage ecosystem partners to close capability gaps.* As we've seen in our research, defense leaders identify several capability gaps as barriers to implementing AI in their organizations, including the talent deficit detailed in the NSCAI report discussed earlier in this report. To fill this skills void, it is essential for defense organizations to continue to team with and collaborate across an ecosystem of partners. As an example, the US Defense Innovation Unit models the power of partnerships in its efforts to accelerate the application of commercial solutions and strengthen national security.<sup>22</sup> (See "Perspectives: Collaborating to advance AI adoption.")
- *Facilitate teaming with organizations outside your typical sphere.* Remove obstacles that prevent partnerships with new players. Roundtable participants emphasized the need to lower barriers to enable teaming with nonstandard partners to pilot emerging technologies. By expanding collaboration with nontraditional partners, defense organizations can tap into new sources of innovation. The AI Accelerator initiative between the US Air Force and the Massachusetts Institute of Technology (MIT) is one example among many of nontraditional partners collaborating to yield positive results.<sup>23</sup> (See "Perspectives: Collaborating to advance AI adoption.")

## Perspectives: Collaborating to advance AI adoption

### US Defense Innovation Unit

In 2015, the US Department of Defense (DoD) created the Defense Innovation Unit (DIU) in Silicon Valley (California) as an experiment to lead the Department's outreach to commercial innovators. Since then, the DIU has become a gateway for collaboration among leading-edge companies and the US military. The DIU has expanded its reach with offices in other major technology hub regions including Austin, Texas, and Boston, Massachusetts, connecting DoD partners with leading technology companies across the country.

The DIU's mission is to strengthen national security by accelerating the adoption of commercial technology throughout the military and growing innovation capabilities. DIU partners with organizations across the Department—from the services and components to combatant commands and defense agencies—to rapidly prototype and field advanced commercial solutions that address national security challenges. AI is 1 of 6 technology areas where the DIU is focused.

The DIU's objective is to reduce the cycle time from problem identification to prototype contract award to 60–90 days. This is a significant improvement to the traditional DoD contracting process, which often takes more than 18 months. DIU prototype projects typically run from 12–24 months and are administered according to Other Transaction (OT) authority. Successful prototypes may transition to follow-on production-OT agreements or Federal Acquisition Regulation (FAR)-based contracts.<sup>24</sup>

According to Mike Brown, the DIU Director, the organization's mission has continued to expand to focus on accelerating the adoption of commercial technology. This new charge includes 2 complementary efforts that increase the number and diversity of the types of companies the department can access.

The first initiative is the National Security Innovation Network (NSIN). The NSIN works with universities, incubators, and accelerators to attract new talent to solve national security challenges and to leverage startups and academic communities for new concept development. The organization also facilitates the launch of new dual-use ventures by commercializing DoD lab technology and supporting customer discovery.

The second initiative is the National Security Innovation Capital (NSIC). NSIC provides a way to catalyze private investment in hardware. The venture capital industry in the US is more focused on software than hardware, but the military runs on hardware. This initiative enables dual-use hardware startups to advance key milestones in their product development by addressing the shortfall of private investment from trusted sources.<sup>25</sup>

### US Air Force and Massachusetts Institute of Technology AI Accelerator

To build AI capabilities critical to maintaining the economic and national security of the US, the Department of the Air Force (DAF) entered into a cooperative agreement with MIT to jointly create an AI Accelerator hosted by the university. The AI Accelerator leverages the combined expertise and resources of the 2 entities and conducts critical research to enable rapid prototyping, scaling, and the ethical application of AI algorithms and systems to advance both the DAF and society in general.

The AI Accelerator is enabled by a multidisciplinary team of officers and enlisted airmen embedded with MIT faculty, researchers, and students. Additionally, the AI Accelerator leverages universities, small businesses, traditional defense, and nontraditional commercial ventures, all collaborating to develop and help facilitate the ethical use of AI technologies for society and the nation.<sup>26</sup>

**Build cultures and mechanisms that foster open innovation and experimentation.**

Exponential technologies such as AI enable organizations to capture and analyze vast quantities of data and support accelerated discovery and innovation. According to 2021 IBV research, 50% of global executives indicated AI has a high potential for driving innovation in the next 3 years.<sup>27</sup> Implementing modernization mechanisms and creating an organizational culture that enables and values innovation are critical. However, pursuing the full potential of exponential technologies such as AI requires looking beyond organizational silos and considering the following:

- *Encourage open innovation and integrate concepts into training and operations.* The combination of exponential technologies, accelerated digitization, and rising stakeholder expectations has created an urgent imperative to embrace open innovation. Having already demonstrated significant value in the private sector, open innovation has rapidly become an engine of growth and business performance. With open innovation, ecosystem partners look for opportunities within and across value chains. Leaders of successful organizations understand how internal and external innovation capabilities can complement one another—and they invest in both.<sup>28</sup> In fact, our research reveals that private sector organizations embracing open innovation had a 59% higher rate of revenue growth compared to those that didn't.<sup>29</sup> Looking forward, teaming, open innovation, and experimentation must be a cornerstone of defense organizations and ingrained in how they train and operate.
- *Cultivate a culture that breaks down innovation barriers.* Open innovation requires an open culture that encourages collaboration and fosters a passion for discovery, creativity, and knowledge. Achieving this culture requires deliberate efforts and should be manifested in the organization's operating model. Leaders need to define how work and collaboration are prioritized, incentivized, and accomplished. And most important, leadership and ownership of the organizational culture should start and branch out from the very top of the enterprise.<sup>30</sup> Leaders must have the courage to break down barriers and change cultures. "First and foremost, we need leaders who can adapt and innovate," explained retired US Army Lieutenant General H.R. McMaster in an interview on how militaries learn and adapt. General McMaster went on to emphasize other aspects critical to the development of future leaders, including lifelong learning and collaborative study. But more importantly, he emphasized, "Our leaders can't feel compelled to tell their bosses what they want to hear."<sup>31</sup>

Cultural change is not easy. It requires commitment from leadership at all levels. Moreover, it requires instilling and continuously reinforcing these values in future leaders. Defense organizations often struggle to embrace the cultural shifts needed when adopting new capabilities such as AI. But as our roundtable participants suggest, the natural competition that exists among military organizations can be leveraged as "collaboration competition" to further their collective efforts. For example, organizing team competitions that challenge future leaders in service academies to develop solutions leveraging emerging technologies could both spark innovation and serve as a meaningful step toward shifting the culture.

We hope this report helps further the knowledge of current and future military leaders and assists their efforts to leverage emerging technologies such as AI to advance the critical-mission objectives of defense organizations globally.

## Study approach and methodology

The IBM Institute for Business Value, in cooperation with Oxford Economics, surveyed 250 executives from global defense organizations in 2020. Respondents included 250 CIOs (49%) and CTOs (51%) from the following Five Eyes intelligence alliance and NATO nations: Australia, Belgium, Canada, Czech Republic, Denmark, France, Germany, Netherlands, New Zealand, Norway, Poland, the United Kingdom, and the United States.

Executive respondents were screened to help ensure they were both familiar with AI and their organizations' strategies and plans for investing in and implementing AI capabilities in the future. These leaders represent organizations from a broad range of mission functions, including combat and fighting arms (18%), combat support (44%), and combat service support (37%) organizations.

In March and November 2021, the IBM Center for the Business of Government convened a series of roundtables of experts and stakeholders to reflect on the insights from this research and what it means for the future of AI in defense. Participants discussed both the opportunities and challenges that organizations face in exploiting the full potential of AI-enabled capabilities. The discussions from the roundtables provided additional input and context for this report.

## Roundtable participants

### Defense

David Bray, Director, GeoTech Center and Commission, Atlantic Council, and former CIO, Federal Communications Commission

Rose Butchart, Associate Fellow, Defense Industrial Initiatives Group, Center for Strategic and International Studies

Gordon "Skip" Davis, Deputy Assistant Secretary General, Defense Investment Division, NATO

Alka Patel, Vice President, Government and External Affairs, Comcast, and former Chief of Responsible AI, US Department of Defense, Joint AI Center

David Rowland, Head of Strategy, Information Systems and Service, Joint Forces Command at UK Ministry of Defence

BGen Patrice Sabourin, Director General, Information Capabilities Force Development, Canadian Armed Forces

Kristin Saling, Acting Director, People Analytics, Office of the Assistant Secretary of the US Army for Manpower and Reserve Affairs

Dr. Michael D. Street, Head, Innovation and Data Science, NATO Communications and Information Agency

### IBM

Dan Chenok, Director, IBM Center for the Business of Government, IBM Client Centers

Margaret Graves, Fellow, IBM Center for The Business of Government, and former Deputy Federal CIO for the Office of Management and Budget

Leendert Van Bochoven, IBM Global Defence and Intelligence Leader

Dave Zaharchuk, Research Director, IBM Institute for Business Value

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## Related reports

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“Deploying AI in defense organizations: The value, trends, and opportunities.”  
IBM Institute for Business Value. May 2021. <https://ibm.co/ai-defense>

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“Open the door to open innovation: Realizing the value of ecosystem collaboration.”  
IBM Institute for Business Value. January 2022. <https://ibm.co/open-innovation>

### **Digital acceleration**

“Digital acceleration: Top technologies driving growth in a time of crisis.”  
IBM Institute of Business Value. January 2022. <https://ibm.co/digital-acceleration>

## Notes and sources

- 1 “How Alan Turing Cracked The Enigma Code.” Imperial War Museums website, accessed January 24, 2022. <https://www.iwm.org.uk/history/how-alan-turing-cracked-the-enigma-code>
- 2 Chenok, Daniel, Leendert van Bochoven, and David Zaharchuk. “Deploying AI in defense organizations: The value, trends, and opportunities.” IBM Institute for Business Value. May 2021. <https://ibm.co/ai-defense>
- 3 Flores, Benjamin J., and Bob Drury. “Reshaping your corps.” *Men’s Health*. June 2, 2011. <https://www.menshealth.com/trending-news/a19530320/marine-corps/>
- 4 Chenok, Daniel, Leendert van Bochoven, and David Zaharchuk. “Deploying AI in defense organizations: The value, trends, and opportunities.” IBM Institute for Business Value. May 2021. <https://ibm.co/ai-defense>
- 5 Finkel, Caroline. *Osman’s Dream: The Story of the Ottoman Empire, 1300–1923*. New York: Basic Books. 2006; “Siege of Yorktown.” Britannica website, accessed January 24, 2022. <https://www.britannica.com/event/Siege-of-Yorktown>
- 6 Harari, Oren. *Leadership Secrets of Colin Powell*. Diane Pub Co. 2004.
- 7 Quote Investigator website, accessed February 4, 2022. <https://quoteinvestigator.com/2017/11/18/planning/>
- 8 Stanley-Lockman, Zoe, and Edward Hunter Christie. “An artificial intelligence strategy for NATO.” NATO Review. October 25, 2021. <https://www.nato.int/docu/review/articles/2021/10/25/an-artificial-intelligence-strategy-for-nato/index.html>
- 9 “Lou Holtz quotes.” All Great Quotes website, accessed February 17, 2022. <https://www.allgreatquotes.com/quote-254353/>
- 10 “The Technology Modernization Fund.” US Chief Information Officer Council. TMF website, accessed November 23, 2021. <https://tmf.cio.gov/>
- 11 Hom, Elaine J. “Steve Jobs Biography.” *Business News Daily*. October 29, 2021. <https://www.businessnewsdaily.com/4195-business-profile-steve-jobs.html>
- 12 IBM Institute for Business Value Human Insights survey of 9,473 employees across 9 countries conducted in August/September 2021; “What employees expect in 2021: Engaging talent in the shadow of COVID.” IBM Institute for Business Value. February 2021. <https://ibm.co/employee-expectations-2021>
- 13 IBM Institute for Business Value Human Insights survey of 9,473 employees across 9 countries conducted in August/September 2021.
- 14 “The National Security Commission on Artificial Intelligence Final Report.” The National Security Commission on Artificial Intelligence website, accessed January 26, 2022. <https://reports.nscai.gov/final-report/table-of-contents/>
- 15 “Emerging and Disruptive Technologies.” NATO website. October 22, 2021. [https://www.nato.int/cps/en/natohq/topics\\_184303.htm](https://www.nato.int/cps/en/natohq/topics_184303.htm); “U.S., U.K. Research Labs Collaborate on Autonomy, Artificial Intelligence.” US Air Force. October 20, 2021. <https://www.af.mil/News/Article-Display/Article/2817083/us-uk-research-labs-collaborate-on-autonomy-artificial-intelligence/>
- 16 “US, UK Research Labs Collaborate on Autonomy, Artificial Intelligence.” US Air Force. October 20, 2021. <https://www.af.mil/News/Article-Display/Article/2817083/us-uk-research-labs-collaborate-on-autonomy-artificial-intelligence/>
- 17 “Emerging and Disruptive Technologies.” NATO website. October 22, 2021. [https://www.nato.int/cps/en/natohq/topics\\_184303.htm](https://www.nato.int/cps/en/natohq/topics_184303.htm)
- 18 “Day of Affirmation Address, University of Capetown, Capetown, South Africa, June 6, 1966.” JFK Library website, accessed November 16, 2021. <https://www.jfklibrary.org/learn/about-jfk/the-kennedy-family/robert-f-kennedy/robert-f-kennedy-speeches/day-of-affirmation-address-university-of-capetown-capetown-south-africa-june-6-1966>
- 19 Beard, Alison (interviewer). “Admiral Mike Mullen.” *Harvard Business Review*. August 1, 2014. <https://hbr.org/2012/06/admiral-mike-mullen>
- 20 “Technical Experimentation.” US Special Operations Command (USSOCOM). Special Operations Forces Acquisition, Technology & Logistics website, accessed November 29, 2021. <https://www.socom.mil/sof-atl/pages/technical-experimentation.aspx>
- 21 “D-Day.” History.com website, accessed January 26, 2022. <https://www.history.com/topics/world-war-ii/d-day>
- 22 “About Defense Innovation Unit (DIU).” US Defense Innovation Unit website, accessed November 23, 2021. <https://www.diu.mil/about>
- 23 “About Us.” USAF-MIT AI Accelerator website, accessed September 28, 2021. Massachusetts Institute of Technology. <https://aia.mit.edu/about-us/>
- 24 “About Defense Innovation Unit (DIU).” US Defense Innovation Unit website, accessed November 23, 2021. <https://www.diu.mil/about>
- 25 Keegan, Michael J. “Leading the Defense Innovation Unit.” IBM Center for The Business of Government. December 16, 2021. <https://www.businessofgovernment.org/blog/leading-defense-innovation-unit>
- 26 “About Us.” USAF-MIT AI Accelerator website, accessed September 28, 2021. Massachusetts Institute of Technology. <https://aia.mit.edu/about-us/>
- 27 Dencik, Jacob, Anthony Lipp, and Anthony Marshall. “Open the door to open innovation: Realizing the value of ecosystem collaboration.” IBM Institute for Business Value. December 2021. <https://ibm.co/open-innovation>
- 28 Ibid.
- 29 Payraudeau, Jean-Stéphane, Jacob Dencik, and Anthony Marshall. “Extending digital acceleration: Unleashing the business value of technology investments.” IBM Institute for Business Value. October 2021. <http://ibm.co/extending-digital-acceleration>
- 30 Dencik, Jacob, Anthony Lipp, and Anthony Marshall. “Open the door to open innovation: Realizing the value of ecosystem collaboration.” IBM Institute for Business Value. December 2021. <https://ibm.co/open-innovation>
- 31 Erdmann, Andrew. “How militaries learn and adapt: An interview with Major General H.R. McMaster.” McKinsey. April 1, 2013. <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/how-militaries-learn-and-adapt>

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